

CLARK, LINCOLN, AND WHITE PINE COUNTIES GROUNDWATER DEVELOPMENT PROJECT EIS

**WATER RESOURCES TECHNICAL REVIEW
MEETING 1 – BASELINE DATA
June 23-24, 2005**

Andrew Burns

Southern Nevada Water Authority



Overview

- **BACKGROUND**
 - SNWA Water-Resource Portfolio
 - SNWA Groundwater Applications
- **PROJECT DESCRIPTION**
- **SNWA TECHNICAL STUDIES**
 - Previous Studies
 - Current Studies / Monitoring Programs
- **DATA SUBMITTAL**
- **QUESTIONS??**



BACKGROUND...



Southern Nevada Water Authority

Established in 1991 for the purposes of:

- Seeking new water resources for southern Nevada
- Managing existing and future water resources
- Constructing and managing regional water facilities
- Promoting responsible water conservation
- Presenting a unified position on water issues facing Southern Nevada

Member Agencies:

Big Bend Water District

Boulder City

City of North Las Vegas

City of Henderson

City of Las Vegas

Las Vegas Valley Water District

Clark County Water Reclamation District



SNWA Water-Resource Portfolio

Colorado River Resources

- Nevada Basic Apportionment
- Return Flow Credits
- Surpluses
- Unused Apportionment
- Water Banks
- Transfers / Exchanges

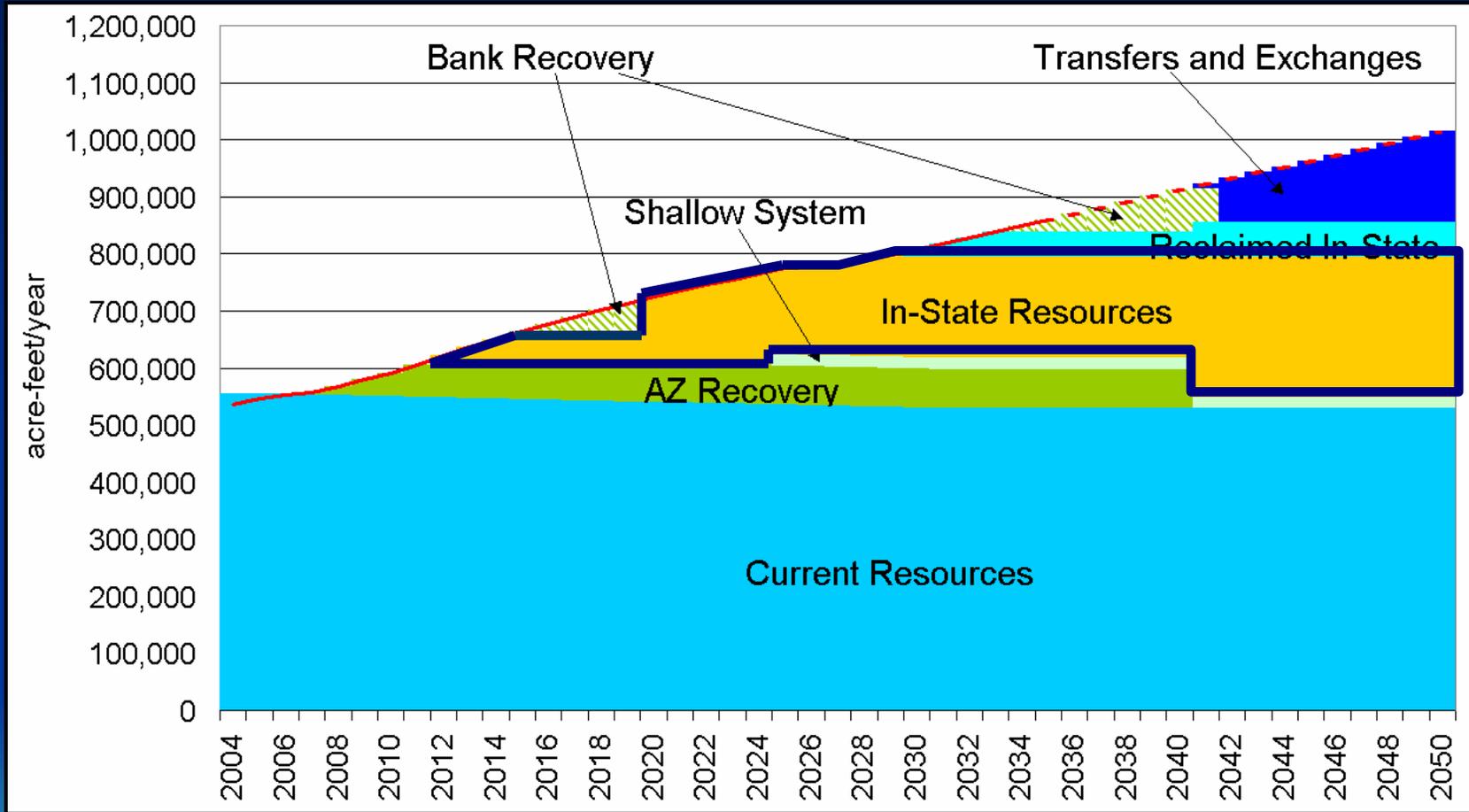
Non-Colorado River Resources

- LVV Groundwater
- LVV Shallow Aquifer
- LVV Reclaimed Groundwater
- Muddy River
- Virgin River
- Groundwater in Clark, Lincoln, and White Pine Counties
- Reclaimed In-State Resources

- Water Conservation



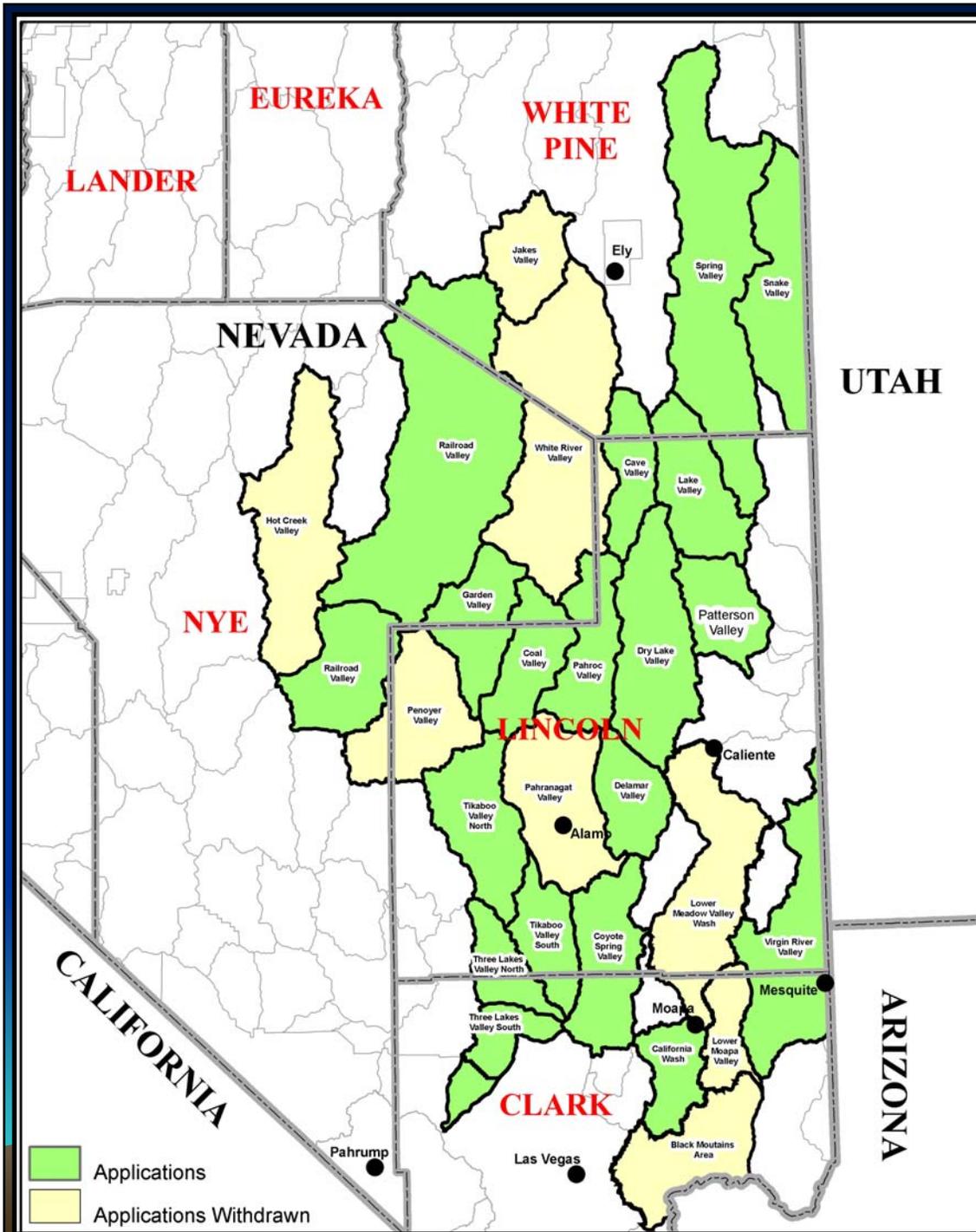
SNWA Water-Resource Portfolio



SNWA Groundwater Applications

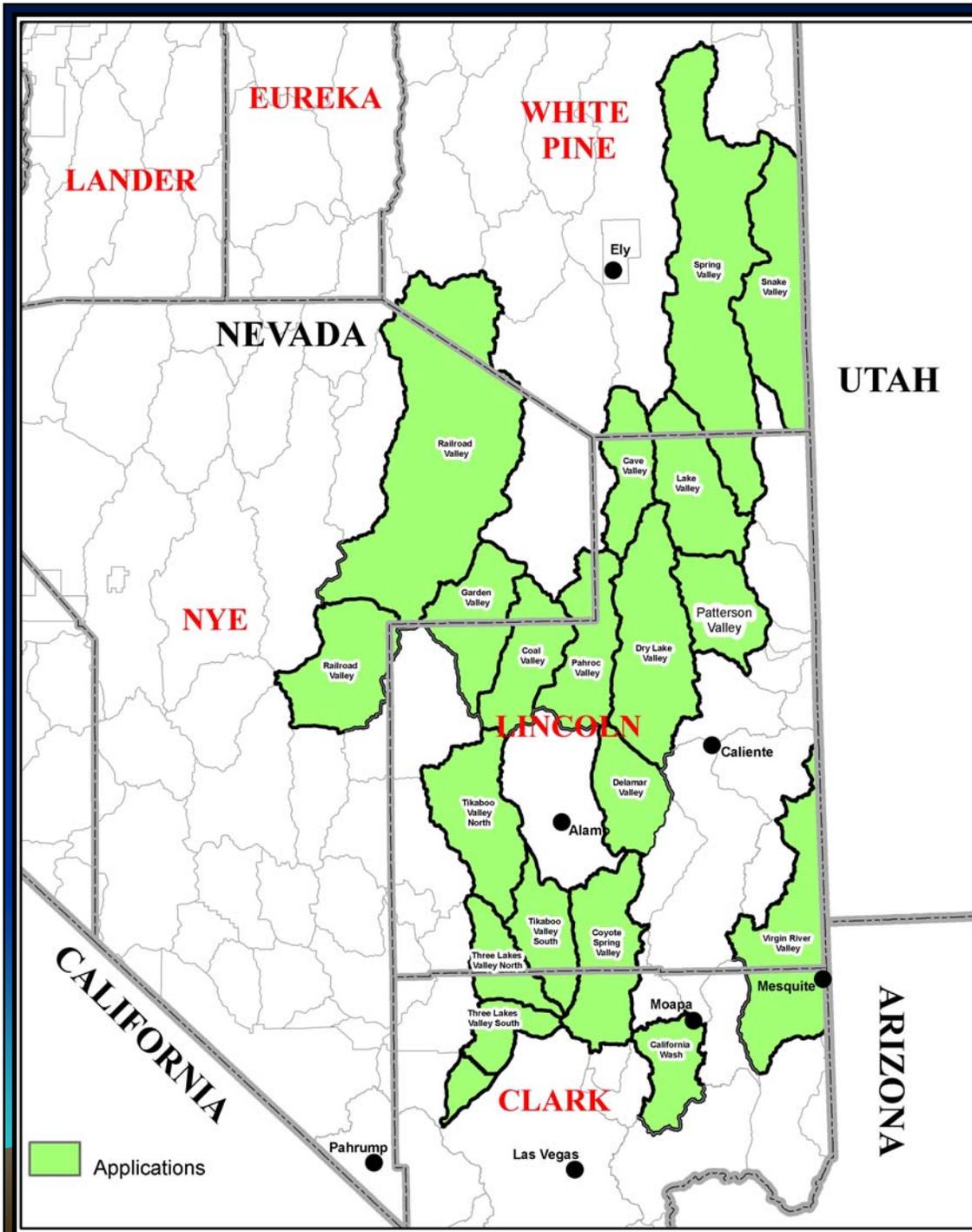
1989 Groundwater applications filed (147 total in 27 basins)

1991 Applications withdrawn in 8 basins (27 total)



SNWA Groundwater Applications

120 groundwater
applications remaining
after 1991

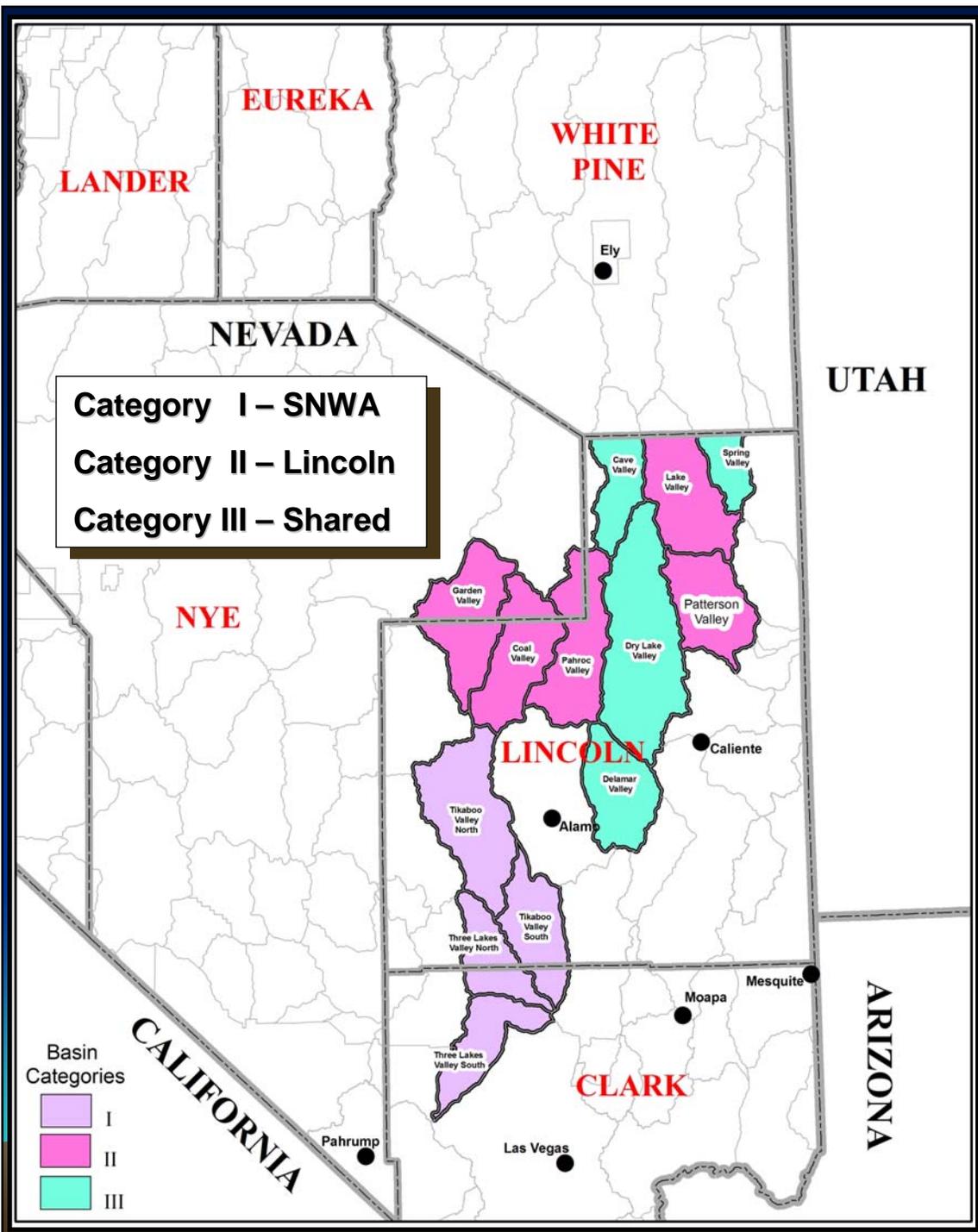


SNWA Groundwater Applications

2003 SNWA / LVVWD
Agreement with
Lincoln County

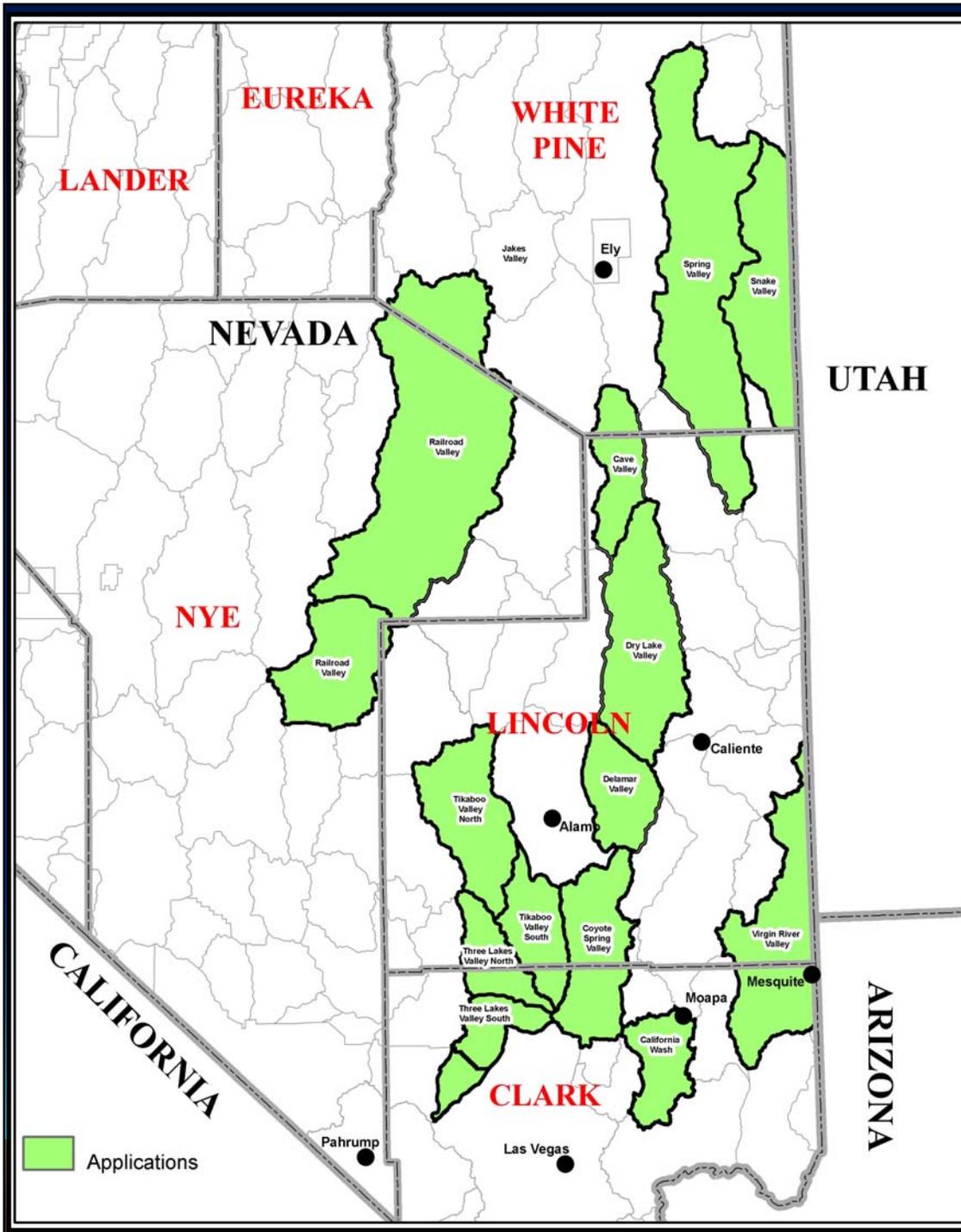
5 applications
withdrawn in
Garden and Coal
Valleys

17 applications
transferred to
Lincoln County



SNWA Groundwater Applications

2005 Current basins with
SNWA groundwater
applications
(88 total in 14 basins)



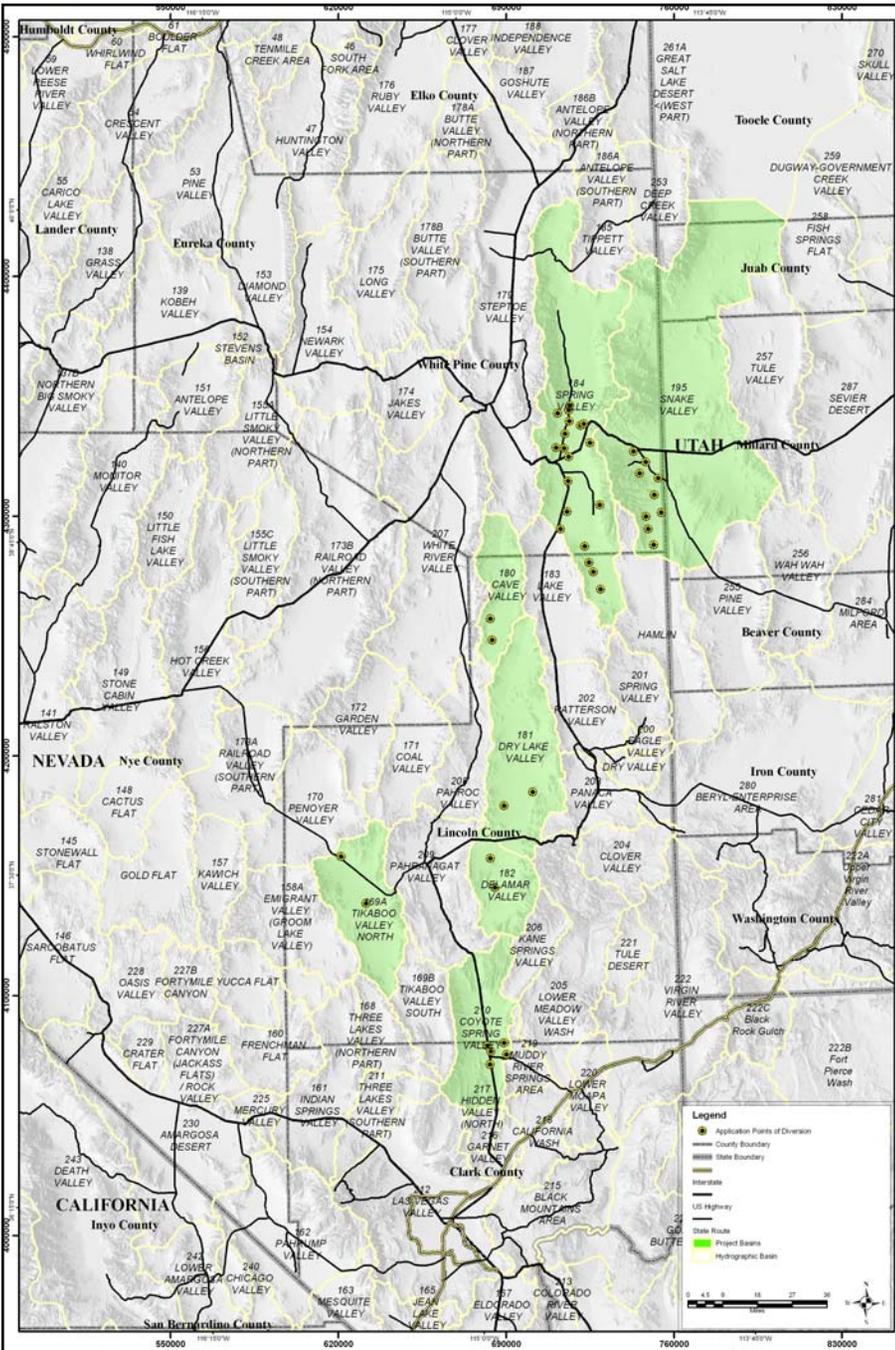
PROJECT DESCRIPTION...



Project Basins

41 Total number of active SNWA groundwater applications in Project Basins:

Tikaboo North
Coyote Spring
Delamar
Dry Lake
Cave
Spring
Snake



Groundwater Application
Points of Diversion Locations

SNWA Data Submittal - BLM Hydrology Technical Team 6/23/05 - 6/24/05

Map ID #11502 06/14/05 JMW

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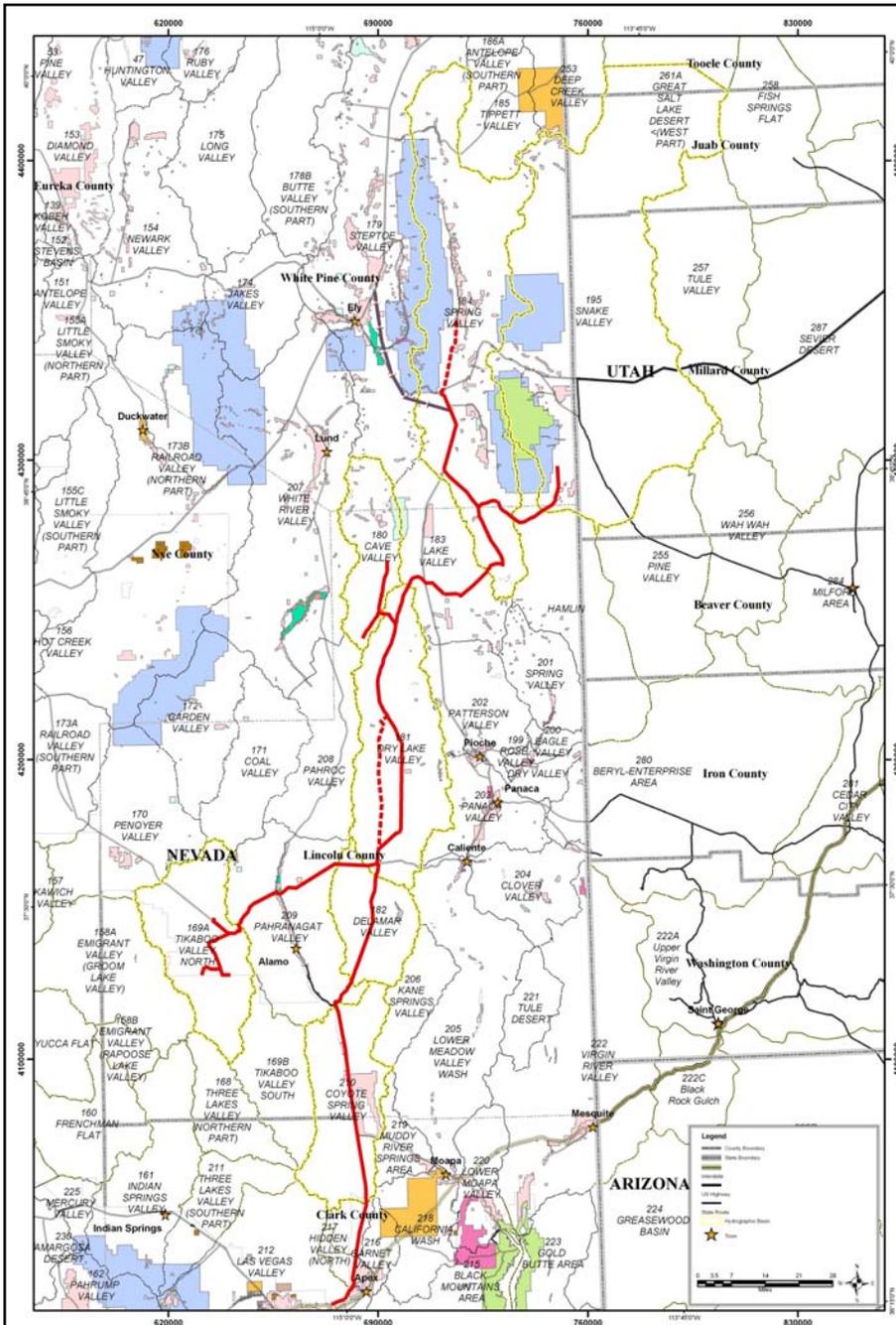
Project Facilities

Water Facilities

- 115 to 195 wells to produce up to 180,000 acre-feet per year
- 235 miles of 54 to 78 inch diameter buried main pipeline
- 110 miles of 24 to 36 inch diameter buried lateral pipeline
- 6 pumping stations (Coyote Spring, Tikaboo (2), Spring, Snake Valleys)
- 40-acre water treatment site in Apex area
- 20-million gallon reservoir in northeast Las Vegas Valley

Power Facilities

- 250 miles of 230 kV overhead power line
- 95 miles of 69kV overhead power line
- 2 primary substations
- 2 hydro turbine energy recovery facilities (Dry Lake and Coyote Spring Valleys)



Facility Alignment Map

SNWA Data Submittal - BLM Hydrology Technical Team 6/23/05 - 6/24/05

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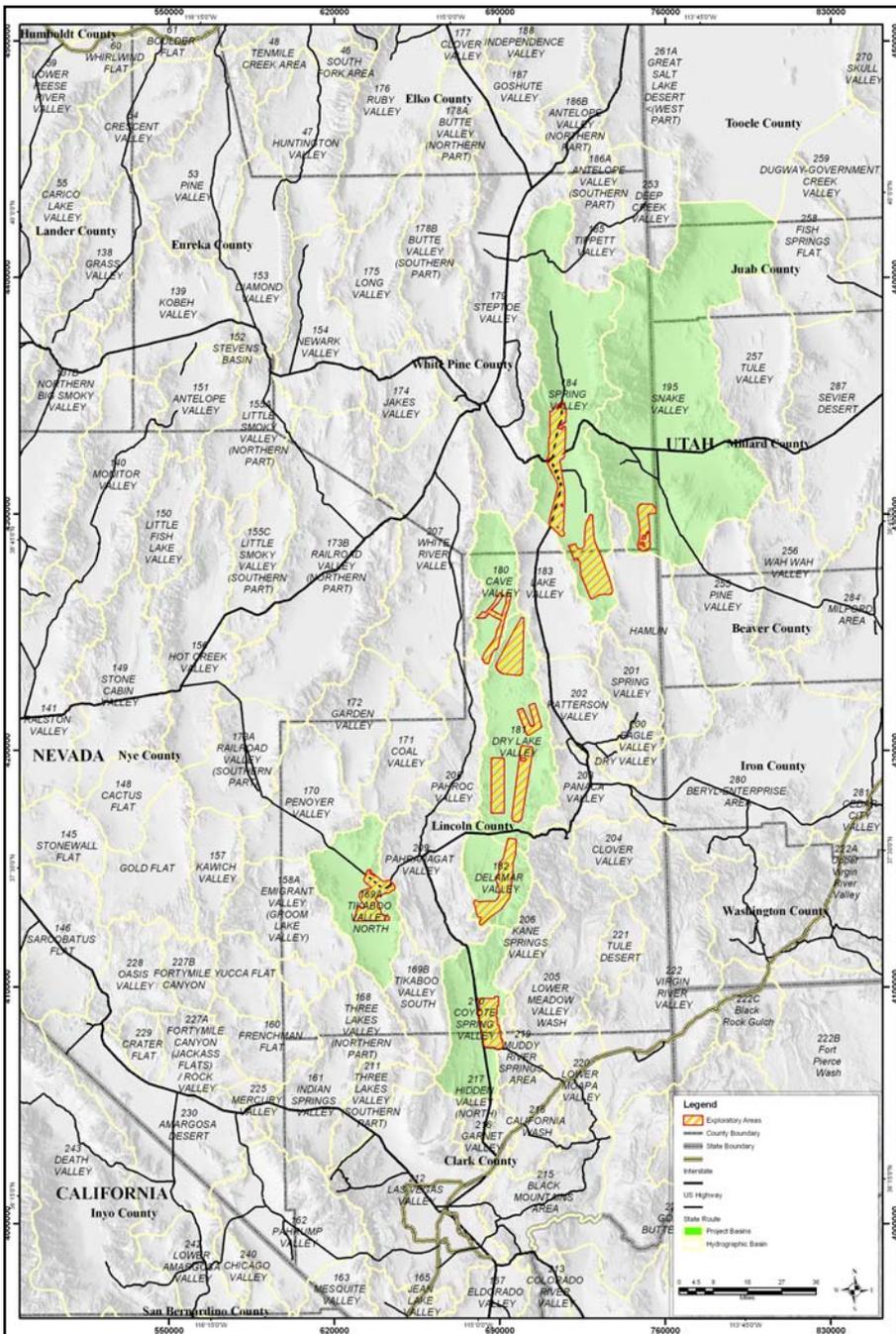
Exploratory Areas

Areas within which production-well sites and well-field locations would be identified based on the results of an exploratory program that would include:

detailed geophysical studies
(gravity data, AMT)

exploratory-well drilling

aquifer testing and water-chemistry sampling



Locations of Exploratory Areas



Anticipated Project Schedule

Environmental review process	2005 - 2007
Exploratory well drilling, geotechnical, survey, and design	2007 - 2009
Primary pipeline construction in all segments except Snake and Tikaboo North Valleys	2009 - 2015
Pipeline construction in Snake Valley	2015 - 2018
Pipeline construction in Tikaboo Valley North	2019 - 2021



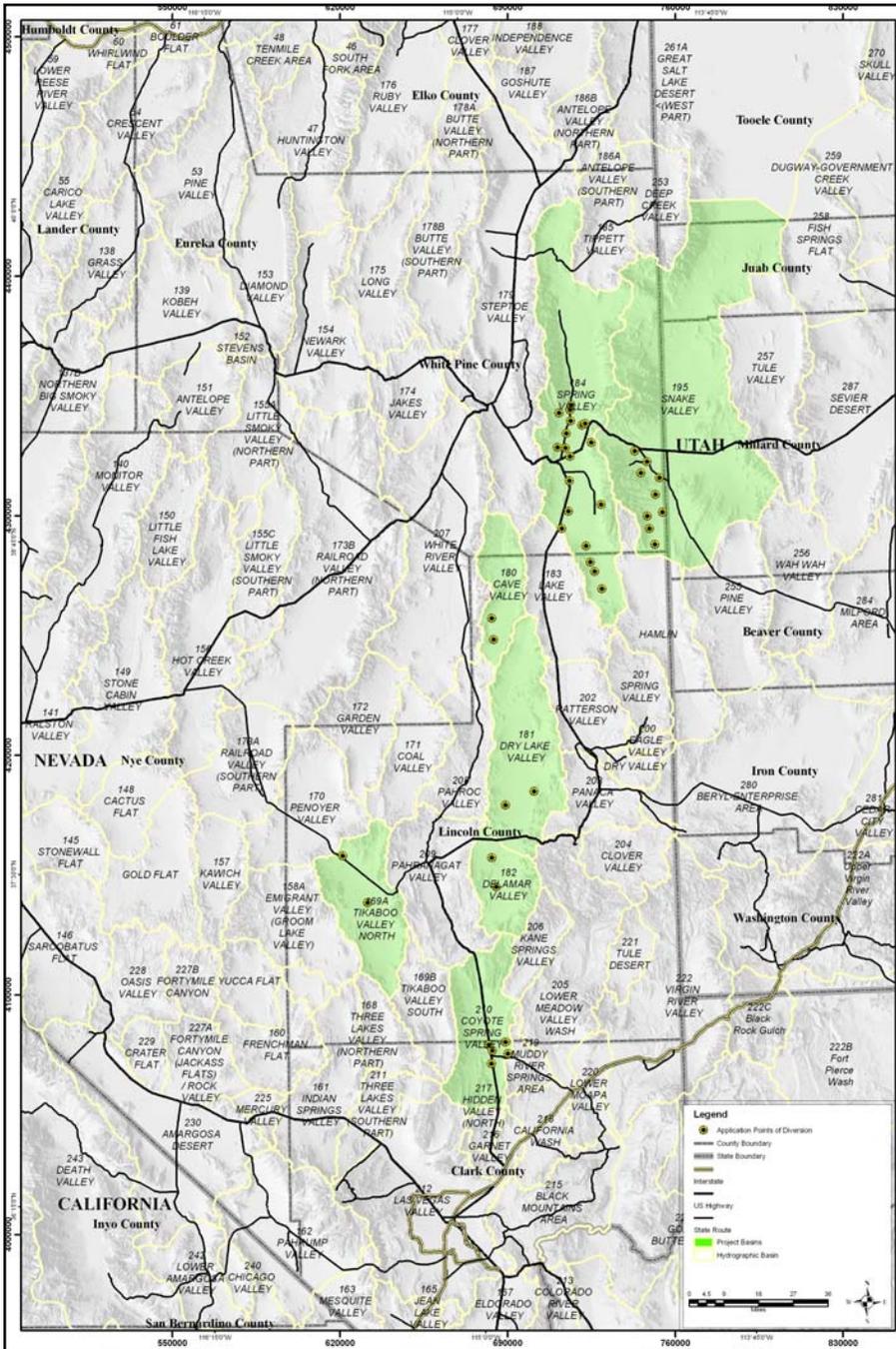
SNWA TECHNICAL STUDIES...



Project Basins

41 Total number of active SNWA groundwater applications in Project Basins:

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Coyote Spring
Delamar
Dry Lake
Cave
Spring
Snake



Groundwater Application
Points of Diversion Locations

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Project Basins and Regional Flow Systems

The Project Basins comprise portions of some regional groundwater flow systems:

Salt Lake Desert

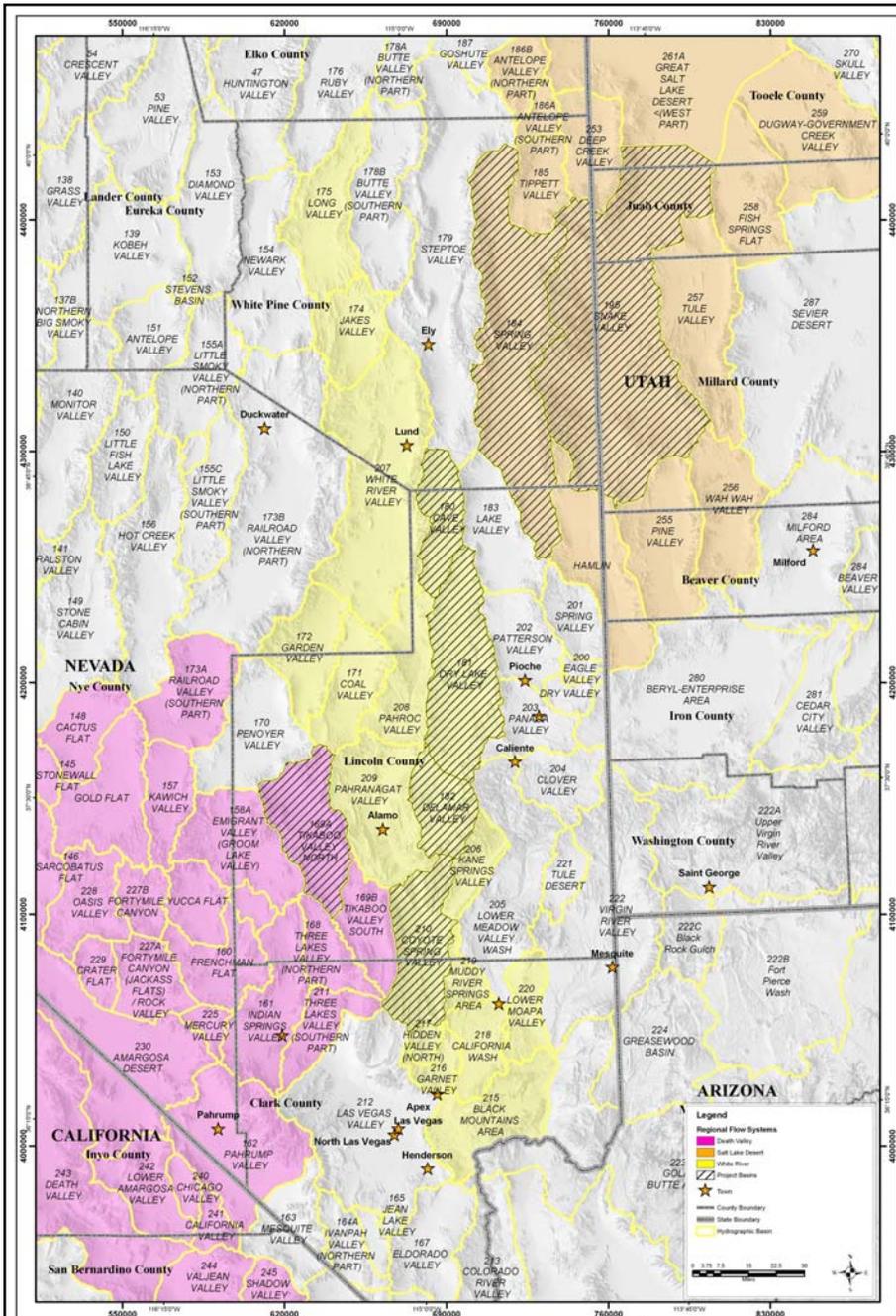
Spring
Snake Valleys

White River

Delamar
Dry Lake
Cave
Coyote Spring

Death Valley

Tikaboo North



Project Basins and Regional Flow Systems

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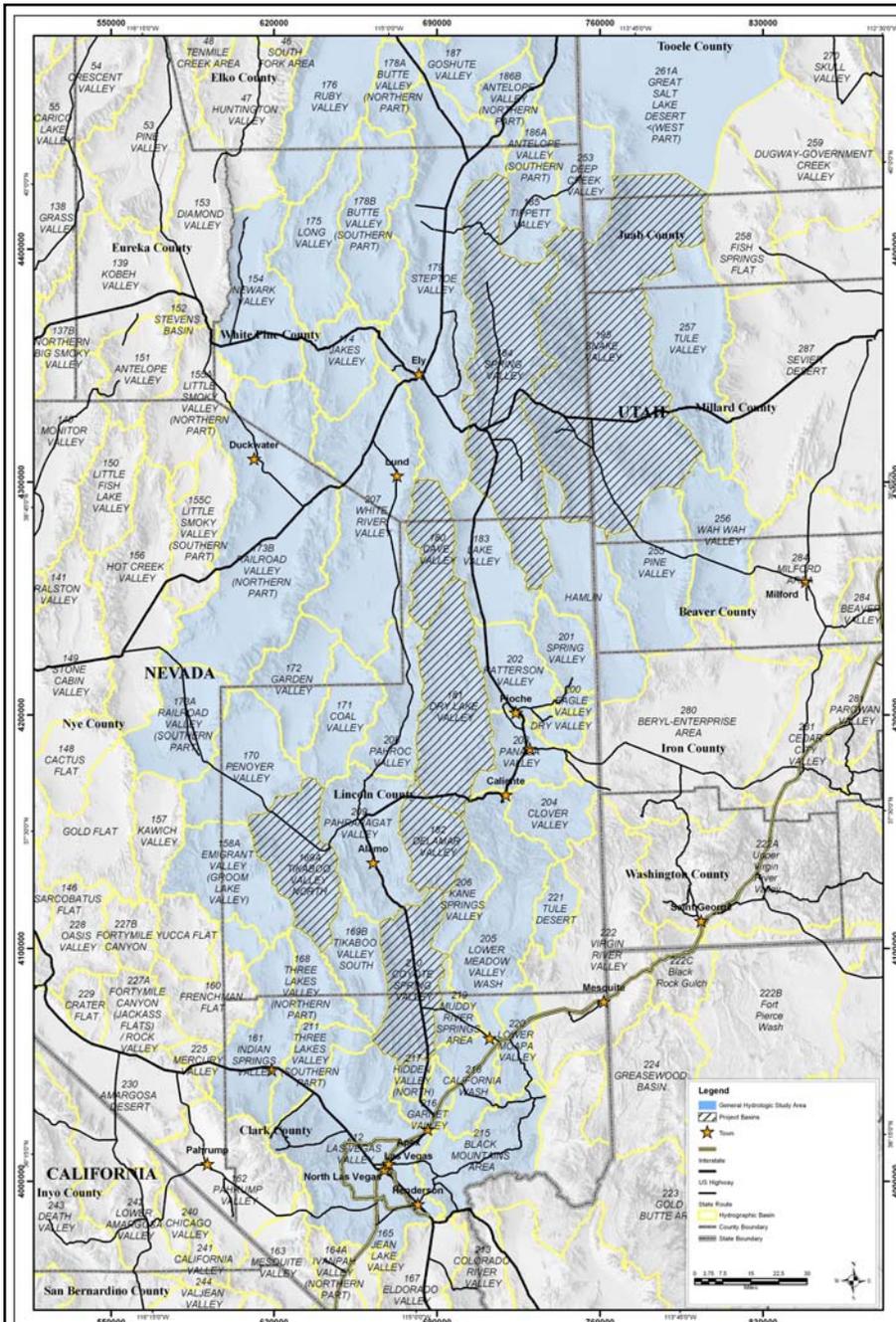
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General Hydrologic Study Area

Levels of Investigation:

Reconnaissance
vs.
Detailed



General Hydrologic Study Area

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Previous Studies

(LVVWD / SNWA Cooperative Projects)

- Feasibility Study of Water Production from Deep Carbonate Aquifers Nevada (Hess and Mifflin, 1978)
(LVVWD / DRI)
- Nevada Carbonate Aquifers Program - NCAP (1985 – 1995)
(NDWR / USGS / USBR / DRI / LVVWD / NLV)
- Groundwater ET (DeMeo, 1996; Nichols, 2000)
(LVVWD / USGS)
- Water Budgets (Nichols, 2000)
(LVVWD / USGS / NDWR)
- Preservation of the USAF MX-Missile Program monitor wells
(LVVWD / USGS)
- Hydrochemistry / Geochemistry / Isotope Mass Balance (Hershey and Mizell, 1995; Thomas, 2001, 2004)
(LVVWD / DRI)
- Streamflow and Water-Level Monitoring Networks (1995 – Present)
(LVVWD / SNWA / USGS / NDWR)
- Geologic Mapping
(LVVWD / SNWA / USGS / NPS)



Previous LVVWD / SNWA Studies

- **Cooperative Water Project (CWP) Report Series**
Related Report Nos. 3, 6, 7, 8, 9, 10, 11, 13, 14, 16, 17
- **Water Resources and Ground-Water Modeling in the White River and Meadow Valley Wash Flow Systems (LVVWD, 2001)**
- **Survey of groundwater and surface-water monitoring sites (SNWA, 2003 and 2005)**
- **Surface Water Resources and Basin Water Budget for Spring Valley, White Pine and Lincoln Counties (LVVWD, 2003)**



Other Relevant Studies

- **NDWR / USGS Reconnaissance Report Series**
- **USAF MX Siting Investigation / Water Resources Program**
- **NDWR Nevada's Water Resources Report Series**
- **USGS Regional Aquifer System Analysis (RASA)**
- **NBMG Geologic Mapping (county maps)**
- **USGS Geologic Mapping**
- **NBMG Oil and Gas Well Databases**



CURRENT SNWA EFFORTS...



Data Collection / Compilation Efforts

- Joint Funding Agreements – Hydrologic Monitoring (USGS / SNWA / LVVWD / NDWR)
- SNWA data collection
 - SE Order 1169 study
 - Groundwater development project
- DRI water-chemistry sampling
- UNR ET / weather-station data / SNWA Vegetation Mapping
- Joint Funding Agreements – Geophysical Surveys (USGS (GUMP) / SNWA)



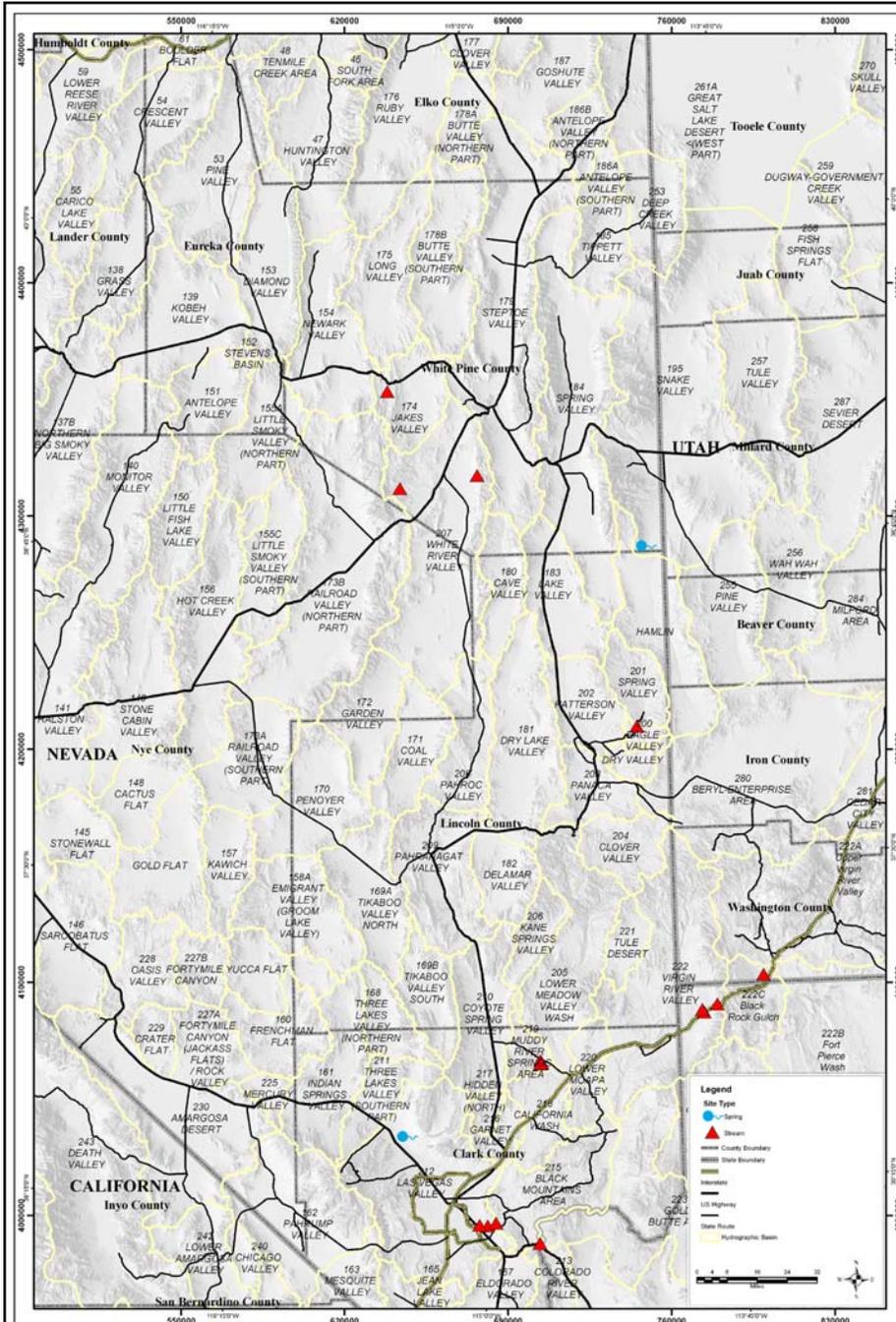
JFA - Hydrologic Monitoring (USGS / SNWA)

1985 Start of Program
(new JFA each year)

19 Surface Water Sites
O&M of Streamflow Sites

3 WQ Sampling Sites

1 USGS OFR Muddy Springs
Report



Monitor Sites Covered By SNWA-USGS Joint Funding Agreement

SNWA Data Submittal - BI M Hydrology Technical Team 6/23/05 - 6/24/05

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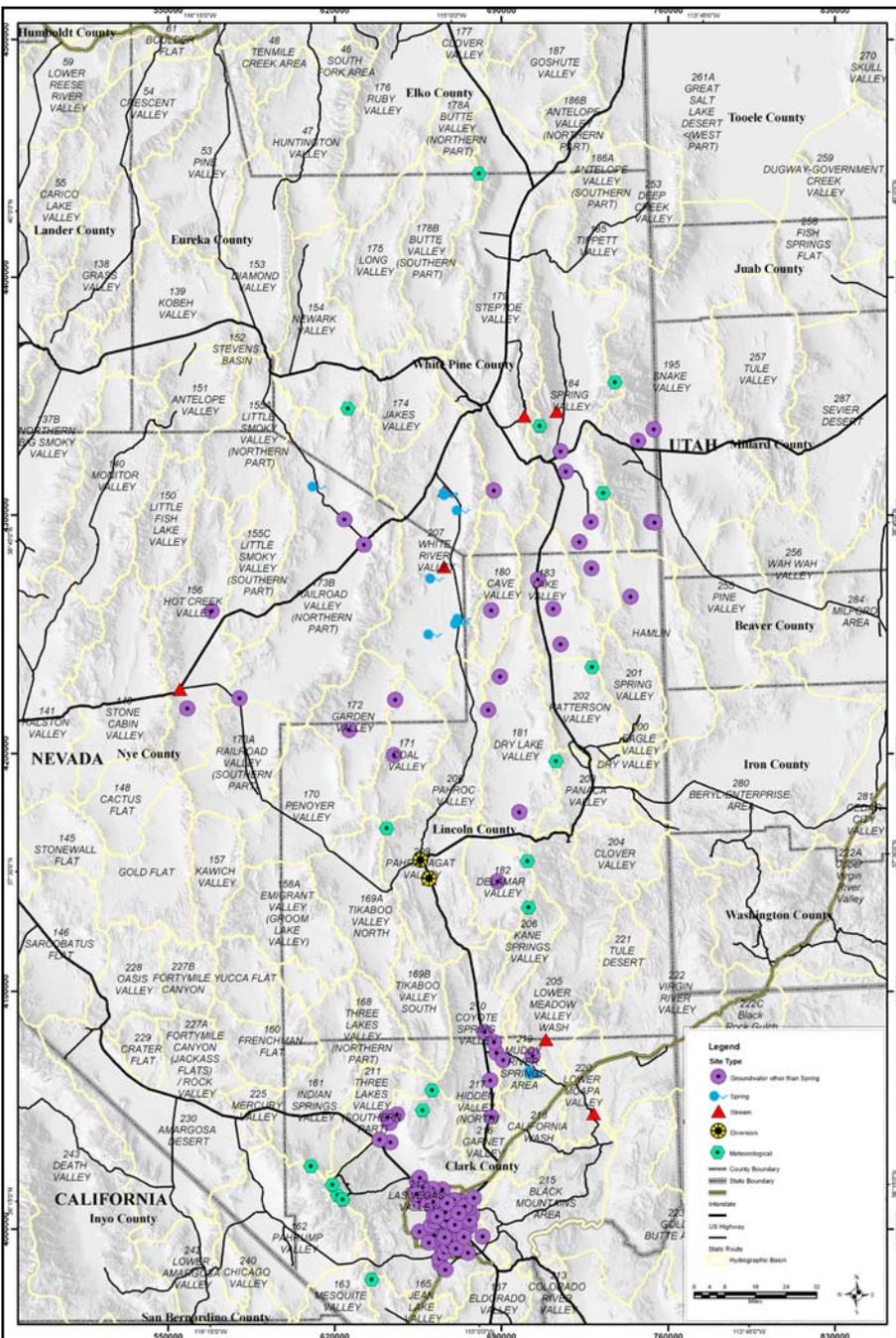
JFA - Hydrologic Monitoring (USGS / NDWR / LVVWD - SNWA)

1985 Start of Program
(new JFA each year)

103 Groundwater Sites
13 Continuous WL Monitoring
63 Quarterly DTW (LVV)
27 Quarterly DTW (Carbonate)

32 Surface Water Sites
9 O&M of Streamflow Sites
22 Biannual Measurements
1 Publication of LVVWD Gage Data

17 High-Altitude Precip. Gages



Monitor Sites Covered By SNWA-USGS-LVVWD-NDWR
Joint Funding Agreement

SNWA Data Submittal - BI M Hydrology Technical Team 6/23/05 - 6/24/05

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Depth-to-Water Measurements (Dry Lake MX, Dry Lake Valley)



SNWA Data Collection

Site Inventory

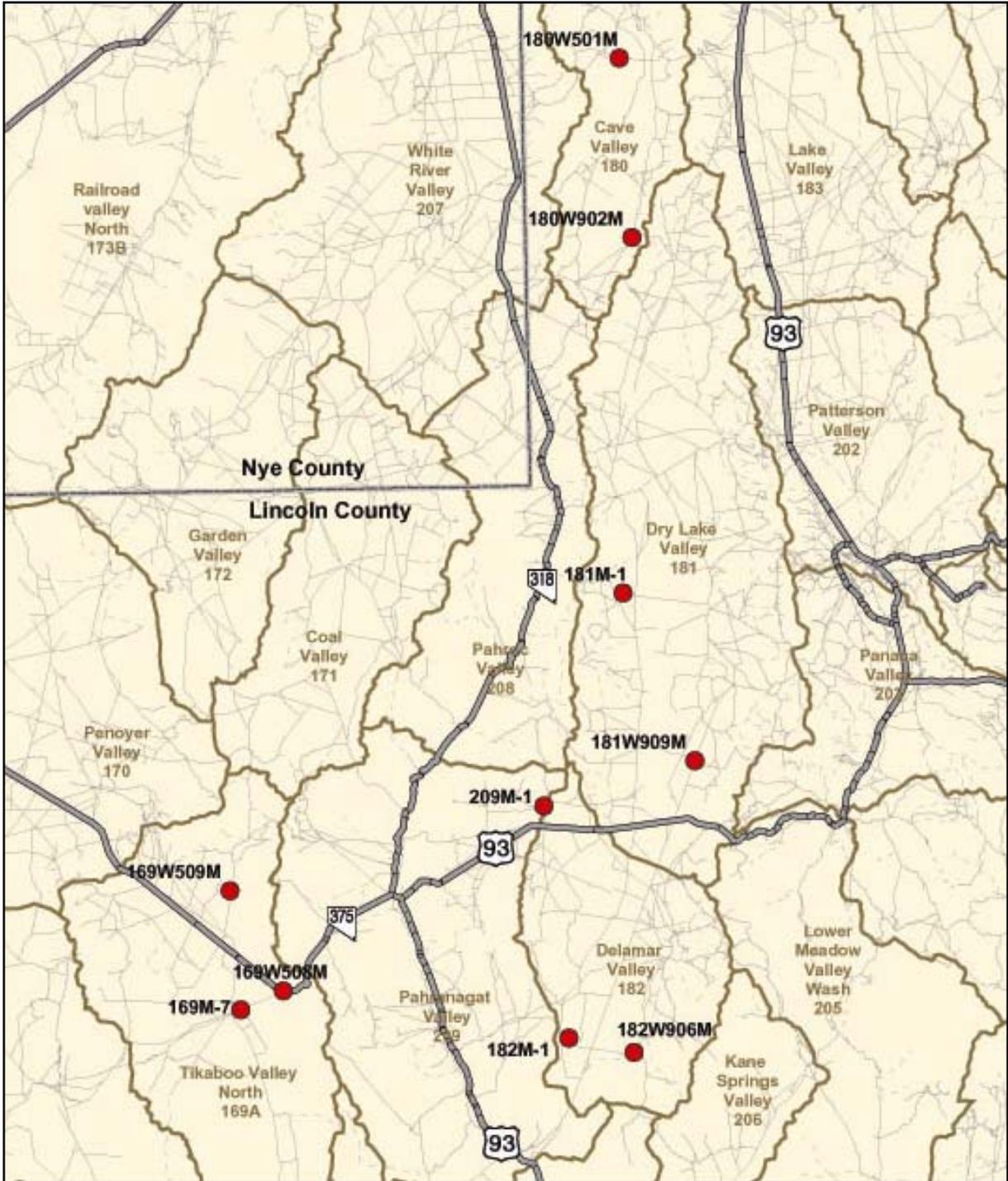
Depth-to-Water Measurements

Stream Discharge Measurements

Spring Discharge Measurements

Water-Chemistry / Isotope
Sampling (wells, streams,
springs)





Monitor-Well Drilling Program

Cave
 Dry
 Delamar
 Tikaboo North

10 Wells

- 4 carbonate
- 4 alluvial
- 2 volcanic

TD 1,100 – 2,340 ft

- 7 6" completions
- 3 12" completions



Monitor-Well Drilling Program

(status as of 06/15/05)

Location	HA	Depth Drilled (ft)	Rock Type	DTW Date	DTW (ft) ¹
181M-1	181	1,430	carbonate	06/09/05	677
181W909M	181	1,320	alluvium	04/30/05	525
182M-1	182	1,320	volcanic	02/21/05	825
182W906M	182	1,640	volcanic		
209M-1	209	940	carbonate		
180W501M	180				
180W902M	180				
169M-7	169				
169W508M	169				
169W509M	169				

¹ DTW measurements reported during drilling

PRELIMINARY DATA ONLY – SUBJECT TO CHANGE





UNR / SNWA Phreatophyte Mapping and ET Measurements

**Mapping completed by SNWA
during 2004 – 2005**

**Estimate / Measure ET rates at
selected sites in White River and
Spring Valleys**

**2 eddy covariance flux systems
2 stationary weather stations**

**Estimate annual ET in White River
and Spring Valleys using measured
ET and remote-sensing techniques**



JFA – Geophysical Studies (USGS GUMP / SNWA)

USGS Geophysical Unit Menlo Park
completing gravity Studies in

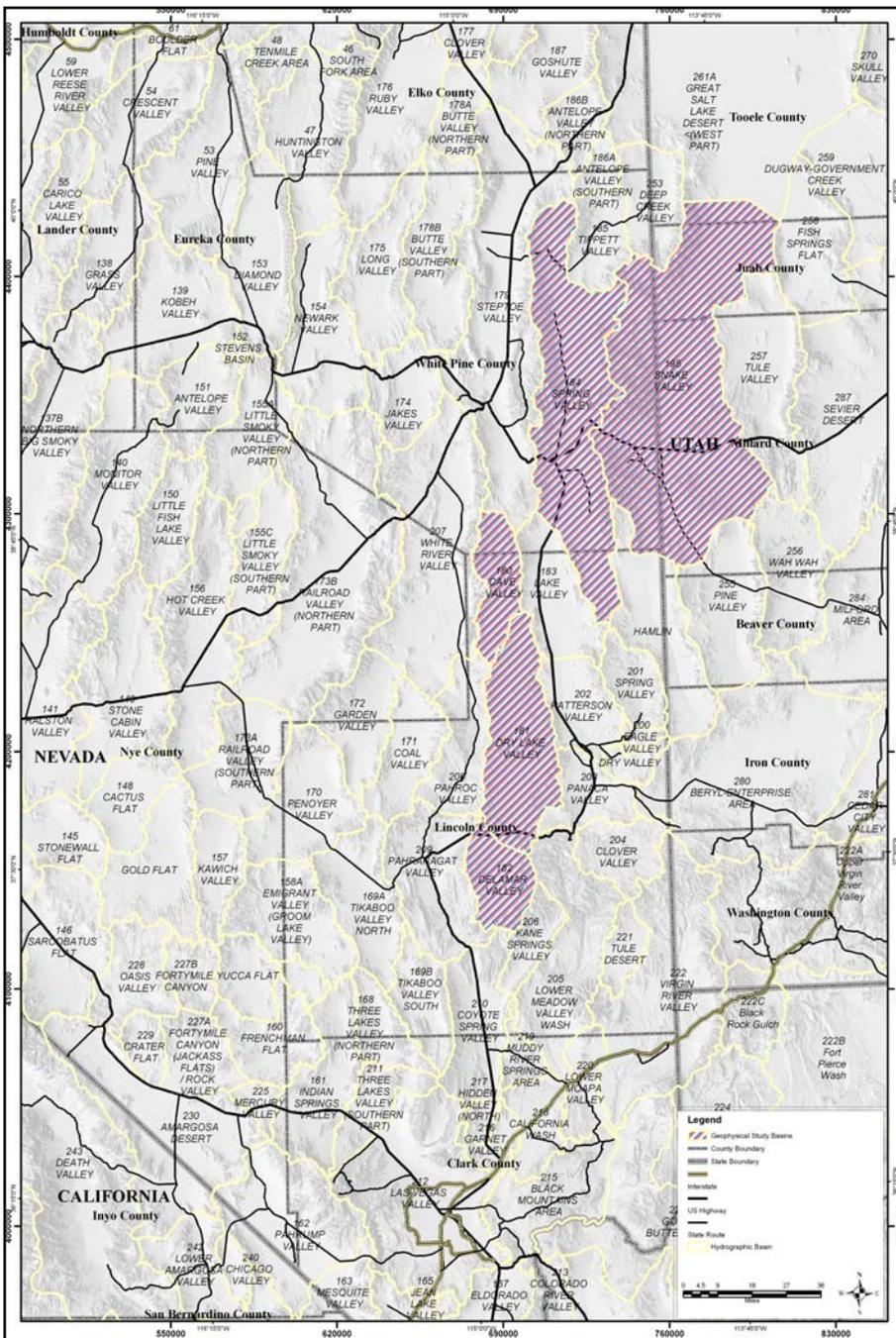
Delamar
Dry
Cave
Spring
Snake

Compilation and qualification of
existing gravity-station data

Collection of additional gravity data

Data analysis and interpretation
(depth-to-basement / valley fill
thickness)

Audiomagnetotelluric (AMT) Studies
In Spring Valley



Basins with JFA Geophysical Studies

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DATA SUBMITTAL...

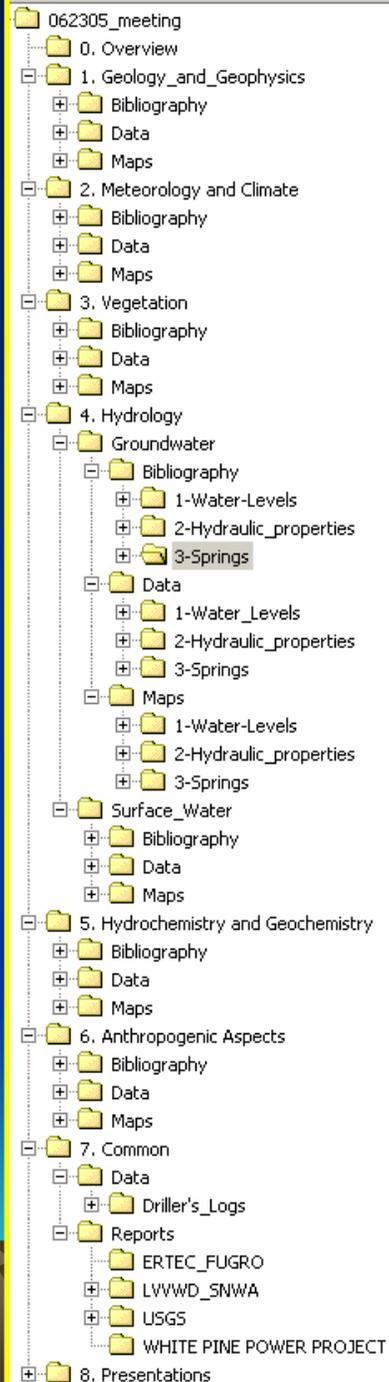


Data Submittal Package

- **Organized by subject matter and agenda items**
 - Geology / Geophysics
 - Meteorology and Climate
 - Vegetation
 - Hydrology
 - Hydrochemistry / Geochemistry
 - Anthropogenic Aspects
- **Material available on DVD**
 - Presentations
 - Data files
 - Selected data reports
 - Reference material



DVD Folder Structure



- **Subfolders**
 - Bibliography
 - Data
 - Maps
- **Common Folder**
 - Data
 - Reports
- **Presentations**



GIS Data Sets

Due to the size of GIS (Geographical Information Systems) data sets, Southern Nevada Water Authority (SNWA) is providing GIS data in a separate format.

For those with ESRI's ArcGIS 9.0 software, an ArcIMS map service has been created by SNWA that includes the GIS data. For those without the appropriate software, an Internet-based GIS data viewer has been created by SNWA and may be accessed using Internet Explorer.

For access to the map service or the viewer, please provide your name, agency, address, e-mail address and phone number along with the type of access you require to:

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(702) 862-3790
lisa.atwood@snwa.com



SNWA Data Presentations

- Description of SNWA data compilation and collection efforts
 - Data types, methods of measurement, data sources, spatial distribution
- General data observations
- DVD contents



SNWA Data Presentations

(Day 1)

- **Geology and Geophysics**
- **Meteorology and Climate**
 - **Precipitation Data**
 - **Potential ET / ET Data**
- **Vegetation**



SNWA Data Presentations (Day 2)

- **Hydrology**
 - Surface Water
 - Groundwater
 - Water-Level Data
 - Aquifer-Properties Data
- **Hydrochemistry / Geochemistry**
- **Anthropogenic Aspects**



QUESTIONS??...

